DEVICE FOR SUPPORTING A PATIENT FOR COMPUTER TOMOGRAPHS

[0001] The invention relates to a device for supporting a patient for a computer tomography device.

[0002] Computer tomography devices, or simply CTs, serve to make three-dimensional images or images of slices through a body to be examined. The image data are obtained by means of X-radiation, using an X-ray beam source that rotates on a circular path around the body to be examined. An X-ray detector rotates jointly with the X-ray beam source, but diametrically opposite it, and detects the raw image data.

[0003] The raw image data represent two-dimensional X-ray projections with many different projection directions, dictated by the rotation. From the two-dimensional X-ray projections, slice images or three-dimensional X-ray images are generated by a computer.

[0004] The quality of the X-ray images that can be generated depends substantially on the stable, exact position of the body to be examined. Deviations in the position of the body from the optimal position in the CT and changes in the body position during the time-consuming detection of the X-ray image detector impair the quality.

[0005] To be able to assure the stable and exact positioning of the body or in other words the patient in the CT, it is usual to provide a device for supporting a patient. A CT has a so-called gantry, inside which the X-ray beam source and the X-ray image detector rotate. At the center of this rotary motion, the gantry has an opening, in which the patient must be positioned for the detection of the raw image data. The device for supporting a patient serves to slide a patient, supported on it, into the opening in the gantry.

[0006] The supporting device is sufficiently stable to be able to bear the weight of the patient, and sufficiently movable to enable positioning the patient inside the gantry.

[0007] However, sagging of the device for supporting a patient or of a stretcher placed on it from the weight of the patient can hardly be avoided. It is usual to reduce or prevent such sagging by means of additional structural provisions, such as additional braces.

[0008] The device for supporting a patient is intended to allow placing the patient or the stretcher along with the patient onto it without problems. To that end, it should be movable in many directions and in particular should be capable of being lowered quite far, so that a patient being placed on it or shifted to it need not be lifted. On the one hand, this puts less of a burden on the medical staff. On the other, it also relieves the patient, for whom, depending on his physical condition, the shifting can be unpleasant and painful. Especially when a patient is being examined by more than one kind of medical equipment, such as a CT as well as a C-arch X-ray machine, the frequent shifting from one machine to another is a great burden and entails great effort.

[0009] German Patent Disclosure DE 101 08 549, it is known to support a patient on a stretcher that can be moved by a so-called trolley, or in other words a movable carriage. To make a CT scan, the stretcher is placed on a fixed base, located in front of the gantry of a CT, on which it can be introduced into the gantry and removed again. The fixed base assures stable positioning of the patient. It does not offer any further motion capabilities.

[0010] A device for supporting a patient for a CT, which assures stable positioning of the patient and at the same time offers versatile movability. The further object of the invention is to disclose a CT with a device for supporting a patient in which stable positioning of the patient and at the same time versatile moveability are assured.

[0011] This object is attained by a device for supporting a patient having the characteristics of the independent claim 1.

[0012] A fundamental concept of the invention is to disclose a device for supporting a patient for a computer tomography device, which includes a gantry with an examination opening for introducing a patient to be examined; the device for supporting a patient has a height adjuster, which is embodied for supporting a

stretcher adjustably in height. The height adjuster can be mounted on the computer tomography device in such a way that it is located laterally of the examination opening. Because of the lateral location of the height adjuster, there is the advantage that the space underneath the examination opening in front of the gantry remains free, and a patient or a stretcher can be lowered especially far there. The lowerability is not hindered by the height adjuster. Because of the flexible lowering, an optimal height in a given instance can be assumed for placing a patient on a stretcher or shifting him. Support of the patient or the stretcher in the immediate vicinity in front of the examination opening can also be accomplished, thus providing stable support of the patient largely without sagging from the patient's weight.

[0013] An advantageous embodiment of the invention is that the height adjuster can be mounted on the computer tomography device in such a way that it is located laterally with respect to the gantry. This has the advantage that it does not stand in the way of a tilting motion of the gantry about a horizontal axis, a motion that is usual in the field of medical diagnosis. Instead, the gantry can be tilted unhindered next to and thus past the height adjuster.

[0014] A further advantageous embodiment of the invention is that the height adjuster has a load-bearing arm which is embodied for supporting the stretcher. The load-bearing arm is connected to the height adjuster in such a way that its height is adjustable by this height adjuster, The load-bearing arm is supported rotatably about a vertical axis. This makes for especially versatile movability of the device for supporting a patient. For example, with the patient lying on it, it can be pivoted out of the way of the gantry. This additional movability makes even more-optimal positioning of the device for supporting a patient possible, for placing the patient on it or shifting him onto it. It furthermore allows swiveling a patient lying on it either toward the gantry or toward some other kind of medical equipment, such as a C-arch X-ray machine. By moving the patient to the other device using the device for supporting a patient, another medical examination is made possible without first shifting the patient to another stretcher. This reduces the burden both on the medical staff and on the patient himself.

[0015] In a further advantageous embodiment, the device for supporting a patient has a rotary bearing which is mounted on the load-bearing arm and is embodied so as for supporting the stretcher rotatably about a vertical axis. The rotary bearing represents a second axis of rotation, which expands the motion capabilities of the device for supporting a patient. It makes it possible not only to pivot the stretcher toward the gantry or away from it but also to execute an additional rotation in any pivoted position. This not expands the positioning possibilities with respect to other medical devices, but the additional rotatability can also be used to reduce the space required for pivoting motions, for instance because the pivoting radius of the device for supporting a patient together with the patient is reduced.

[0016] In a further advantageous embodiment of the invention, the device for supporting a patient has a stretcher guide, which is mounted on the rotary bearing rotatably about a vertical axis and is embodied for supporting a stretcher longitudinally displaceably. The displaceability can serve to slide the stretcher, with the patient lying on it, into the gantry or back out again. It represents a further possibility for flexible positioning of the patient or the stretcher.

[0017] In a further advantageous embodiment of the invention, the device for supporting a patient has a second height adjuster, which is embodied for supporting a stretcher adjustably in height, and which can be mounted on the computer tomography device in such a way that it is located laterally with respect the examination opening. As a result, first, the possibilities for positioning the stretcher are expanded still further because the patient is supported by either one or the other height adjuster. Second, it enhances the flexibility in the sense that one stretcher per height adjuster is used, and the two stretchers can for instance be slid into or out of the gantry in alternation. The alternating use makes more efficient use of a computer tomography device possible, because for instance one patient is prepared using the one height adjuster, while another patient is being examined in the computer tomography device, using the other height adjuster.

[0018] In a further advantageous embodiment of the invention, the second height adjuster is embodied for supporting a stretcher on the other side of the

examination opening, diametrically opposite the first height adjuster in the passage direction. This has the advantage that a patient on one height adjuster can be moved into the gantry while being additionally supported on the opposite side of the gantry on the opposite height adjuster.

[0019] Further advantages of the invention will become apparent from the description of the drawings.

[0020] Exemplary embodiments of the invention are described in further detail below in conjunction with the drawings. Shown are:

[0021] Fig. 1, a device for supporting a patient at a gantry;

[0022] Fig. 2, the device for supporting a patient in a pivoted position;

[0023] Fig. 3, the device for supporting a patient pivoted toward a C-arch X-ray machine; and

[0024] Fig. 4, a device for supporting a patient with a second height adjuster.

[0025] In Fig. 1, a device for supporting a patient is shown at a computer tomography device (CT) 1. The CT 1 has a gantry, inside which an X-ray beam source, not shown, and diametrically opposite it an X-ray image detector rotate. The center of the rotary motion is located in the examination opening 4 of the gantry 3. A patient to be examined is slid into the examination opening 4, and both the X-ray beam source and the X-ray image detector rotate around him and in the process pick up the raw image data.

[0026] A device 5 for supporting a patient is mounted on the gantry 4. It carries a stretcher 7, on which a patient can be laid. The stretcher 7 is held by a stretcher guide 11 such that it is longitudinally displaceable inside the stretcher guide. The capability of longitudinal displacement can be utilized such that the stretcher 7 is thrust out of the examination opening 4 so a patient can be placed on it. In that position, the stretcher 7 is readily accessible. For picking up the raw CT image data, the stretcher 7 is slid, with the patient, into the introduction opening 4.

[0027] The stretcher guide 11 is supported by a load-bearing arm 9, with which it is solidly connected. The load-bearing arm 9 in turn is supported in a load-bearing arm bearing 13. The load- bearing arm bearing 13 is connected to a height adjuster 15, by which the height of the load-bearing arm 9 can be adjusted. In the

drawing, the load-bearing arm 9 is not shown at its maximum height but instead has been slightly lowered compared to it. The amount of this lowering is represented in the drawing by the letter h.

[0028] The amount of the lowering of the load-bearing arm 9 is limited only by the mode of operation of the height adjuster 15. The load-bearing arm 9 and thus the stretcher 7 can be lowered as far as the height adjuster 15 allows, at maximum as far as onto the floor of the examination room where the CT 1 is located. Because of the lateral location, the height adjuster 15 does not, with its own dimensions, limit the maximum possible lowering, since it is not located between the stretcher 7 and the floor of the examination room. As a result, the stretcher 7 can be lowered optimally in each case in adaptation to given conditions, for instance so that a patient can be laid on it with the least possible amount of effort. If needed, for instance, a patient can be placed on the stretcher 7 that has been lowered to near the floor, and the stretcher is then raised to the level of the examination opening 4 so that the stretcher 7 can be introduced into it.

[0029] In Fig. 2, a CT 1 as in the preceding drawing is shown, and to that extent the same reference numerals are used. In the embodiment shown, the load-bearing arm 9 that carries the stretcher 7 is supported in the device 5 for supporting a patient rotatably about a vertical axis. It is pivoted about this axis of rotation away from the gantry 3. In the embodiment shown, the load-bearing arm 9 is pivoted together with the load-bearing arm bearing 13 and the height adjuster 15. In a different embodiment, the load-bearing arm may be supported rotatably in the load- bearing arm bearing 13, so that only the load-bearing arm 9 is pivoted, independently of the load-bearing arm bearing 13 and the height adjuster 15.

[0030] a C-arch X-ray machine 2 is shown. The load-bearing arm 9 together with the stretcher 7 is pivoted away from the gantry 3 and into the vicinity of the C-arch X-ray machine 2. As a result, a patient lying on the stretcher 7 can be moved back and forth between the CT 1 and the C-arch X-ray machine 2 without having to be shifted from one stretcher to another. Instead, he can stay on the stretcher 7 and is moved back and forth by means of the pivoting motion of the device for supporting a patient.

[0031] In the embodiment shown, a rotary bearing 17 that supports the stretcher 7 rotatably about a vertical axis is mounted on the load-bearing arm 9. Because of the additional rotary motion, the possibilities for exact positioning of the patient, either in the CT 1 or in the C-arch X-ray machine 2, can be expanded. The space required for the pivoting motion in pivoting the load-bearing arm 9 can also be modified. In the rotary position shown for the stretcher 7, this radius is minimal, while it would conversely be maximal with the stretcher 7 rotated by 90°. Varying the radius of the pivoting motion also expands the range for moving the patient from one device to another using the device 5 for supporting a patient. As a result, the patient can be moved to other devices, not shown, without having to be shifted from one stretcher to another.

[0032] In Fig. 4, a CT as in the preceding drawings is shown. As described above, a device 5 for supporting a patient with a load- bearing arm 9 and a stretcher guide 11 is shown. A stretcher 7 rests on the stretcher guide 11. Laterally with respect to the gantry, there is a height adjuster 15, which supports the load-bearing arm 9 adjustably in height in the load-bearing arm bearing 13.

[0033] In the embodiment shown, a further load-bearing arm 9' is provided, which has a further stretcher guide 11. The further load-bearing arm 9' is supported in a further load-bearing arm bearing 13' and is supported adjustably in height by a further height adjuster 15'. The height adjuster 15, together with the load-bearing arm bearing 13' and the load-bearing arm 9', is located on the other side of the examination opening 4 with respect to the passage direction.

[0034] As a result of the lateral location of the height adjuster 15' next to the gantry 3 and thus next to the examination opening 4, the maximum lowerability of the stretcher guide 11' on the load-bearing arm 9' is assured. A patient lying on the stretcher 7 can be slide, from the stretcher guide 11, into the examination opening 4 and advanced as far as the other stretcher guide 11'. Because of the support of the patient on the further stretcher guide 11', sagging of the stretcher 7 because of the patient's weight can be reduced. Furthermore, once the raw CT image data has been acquired with the patient lying on the first stretcher guide 11, the patient can

be slid all the way through to the other side of the examination opening 4 while lying on the further stretcher guide 11'. On the further stretcher guide 11', he can be moved for instance to a different medical device or taken where another medical action is taken. For that purpose, the movement capabilities described in conjunction with the preceding drawings can be provided for the load-bearing arm 9' and the stretcher guide 11' as well.